

CLAIMS

What is claimed is:

1. An organic electroluminescent display device comprising:
a first electrode;
a second electrode; and
at least one emission layer and charge transport layer disposed between the first electrode and the second electrode,
wherein:
the at least one emission layer comprises a host material comprising at least a first phosphorescent dopant and a second phosphorescent dopant other than the first phosphorescent dopant, and
each of the first phosphorescent dopant and second phosphorescent dopant comprises iridium or platinum.
2. The organic electroluminescent display device according to claim 1, wherein the first phosphorescent dopant has an emission wavelength that overlaps an absorption wavelength of the second phosphorescent dopant so that the first phosphorescent dopant transmits energy to the second phosphorescent dopant.
3. The organic electroluminescent display device according to claim 1, wherein the first phosphorescent dopant has an emission wavelength that is 50 nm or less than an emission wavelength of the second phosphorescent dopant.
4. The organic electroluminescent display device according to claim 1, wherein the at least one emission layer is formed through a deposition process in which the first phosphorescent dopant and second phosphorescent dopant are mixed together in a crucible for use in the deposition process.
5. The organic electroluminescent display device according to claim 1, wherein the at least one emission layer is formed through a deposition process in which the first phosphorescent dopant and the second phosphorescent dopant are co-deposited with an emitting compound.

6. The organic electroluminescent display device according to claim 1, wherein the first phosphorescent dopant is one or more materials selected from the group consisting of Ir(ppy)₃, bis(7,8-benzoquinoline)acetylacetonate iridium, and bis(phenylpyridine)acetylacetonate iridium.
7. The organic electroluminescent display device according to claim 1, wherein the first phosphorescent dopant is used in the amount of 0.1 to 30 % of the at least one emission layer.
8. The organic electroluminescent display device according to claim 1, wherein the second phosphorescent dopant is one or more materials selected from the group consisting of bithienylpyridine acetylacetonate iridium, bis(benzothienylpyridine)acetylacetonate iridium, and bis(2-phenylbenzothiazole)acetylacetonate iridium.
9. The organic electroluminescent display device according to claim 1, wherein the second phosphorescent dopant is used in the amount of 0.1 to 20 % of the at least one emission layer.
10. The organic electroluminescent display device according to claim 7, wherein the first phosphorescent dopant has a higher concentration as compared to a concentration of the second phosphorescent dopant.
11. The organic electroluminescent display device according to claim 1, wherein the first phosphorescent dopant has a superior emission efficiency as compared to an emission efficiency of the second phosphorescent dopant.
12. The organic electroluminescent display device according to claim 1, wherein the first phosphorescent dopant comprises a first type of the iridium and the second phosphorescent dopant comprises a second type of the iridium other than the first type.
13. An organic electroluminescent display device comprising:
a first electrode;

a second electrode; and

an emission layer disposed between the first electrode and the second electrode and comprising a first phosphorescent dopant having a first emitting wavelength and a second phosphorescent dopant other than the first phosphorescent dopant and having a second emitting wavelength which is substantially similar to but other than the first emitting wavelength such that the first phosphorescent dopant transfers received energy to the second phosphorescent dopant to emit light from the second phosphorescent dopant.

14. The organic electroluminescent display device according to claim 13, wherein the first phosphorescent dopant comprises a first type of iridium and the second phosphorescent dopant comprises a second type of iridium other than the first type of iridium.

15. The organic electroluminescent display device according to claim 13, wherein the first emitting wavelength is shorter than the second emitting wavelength.

16. The organic electroluminescent display device according to claim 13, wherein the first phosphorescent dopant has an emission efficiency that is greater than an emission efficiency of the second phosphorescent dopant.

17. The organic electroluminescent display device according to claim 13, wherein the first phosphorescent dopant has a life cycle characteristic that is greater than a life cycle characteristic of the second phosphorescent dopant.

18. The organic electroluminescent display device according to claim 13, wherein the second emission wavelength is closer to a target color coordinate for a corresponding pixel as compared to the first emission wavelength.

19. The organic electroluminescent display device according to claim 13, wherein:

the first phosphorescent dopant is used in a first concentration of 0.1 to 30 % of the emission layer,

the second phosphorescent dopant is used in a second concentration of 0.1 to 20 % of the emission layer, and
the first concentration is greater than the second concentration.

20. The organic electroluminescent display device according to claim 13, wherein the first phosphorescent dopant comprises a first type of a material and the second phosphorescent dopant comprises a second type of the material other than the first type of the material.

21. The organic electroluminescent display device according to claim 13, wherein a difference in the first emitting wavelength and the second emitting wavelength is 50 nm or less and greater than zero.

22. The organic electroluminescent display device according to claim 13, wherein the first phosphorescent dopant is one or more materials selected from the group consisting of Ir(ppy)₃, bis(7,8-benzoquinoline)acetylacetonate iridium, and bis(phenylpyridine)acetylacetonate iridium.

23. The organic electroluminescent display device according to claim 13, wherein the second phosphorescent dopant is one or more materials selected from the group consisting of bithienylpyridine acetylacetonate iridium, bis(benzothienylpyridine)acetylacetonate iridium, and bis(2-phenylbenzothiazole)acetylacetonate iridium.